CHASSIS Lubrication
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Lubrication

THE ESSENCE OF ORDNANCE OPERATION AND MAINTENANCE

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A reprint from ARMY ORDNANCE

About the time the fathers of this nation were planning the Declaration of Independence, one of their far-seeing members warned his contemporaries of how important the careful planning of each detail might become, by publishing these prophetic lines:

For want of a nail, the shoe was lost;
For want of the shoe, the horse was lost;
For want of the horse, the rider was lost;
For want of the rider, the battle was lost;
For want of the battle, the kingdom was lost;
And all for the want of a horseshoe nail!

The moral of Ben Franklin's ditty was well proved later, in the Revolution. The Ordnance Department believes these words of warning to have a significant bearing on the problem of preparing for the intelligent maintenance of the vast quantities of mechanized equipment now being built. Preventive maintenance, particularly as it relates to automotive and kindred types of equipment, has been a much-discussed subject in private industry for many years. Actually, however, it has been blessed with too few sincere advocates, and even fewer who have successfully put it into practice.

One reason for the failure of preventive maintenance to be universally applied is that no fundamental preventive-maintenance program has been planned and inaugurated before the equipment it was intended to preserve had been placed in actual service. This line of reasoning thereby accounts for our concern today over the problems of introducing and putting into operation a complete preventive-maintenance program to provide for Ordnance materiel.

Of such a program, the lubrication phase is perhaps the most important, even though at first glance it might seem but a detail. It must be remembered that no machine can move without creating friction, and a little friction can wreck a lot of machinery. Thus, lubrication is the "Achilles heel" of a machine; or, if you please, the "horseshoe nail" of a modern mechanized army.

Perhaps a word or two on the magnitude of such a program will be helpful. Today, the various arms have in service many thousand tanks, trucks, half-track cars, tractors, and other units of equipment, each of which requires a detailed and accurate lubrication procedure if it is to operate successfully. Within a relatively short time, much additional equipment, requiring similar detailed servicing, will be issued.

The many benefits which result from the selection and application of correct lubricants are recognized by all large operators of motor vehicles. In the case of Ordnance equipment, the same benefits result but are of far greater significance. The use of unsatisfactory or inferior products, or the too-infrequent application of suitable products by a fleet operator, will result in a high ton-mile operating cost; Whereas, in the case of Ordnance, not only will a higher maintenance cost result, but the life of much-needed equipment will be seriously reduced and the equipment made inoperative at critical times. Some conception of the maintenance problems confronting mechanized units can be gained from a recent estimate that $1,000,000 would be required for the maintenance of an armored division for 300 hours of operation. Ordnance lubrication problems, in many respects, are common to those of commercial fleets but are much more difficult for a variety of reasons.

Any program to better lubrication practices for equipment operated by troops must take cognizance of conditions that will exist in time of emergency and during training maneuvers. For this reason, and for simplicity, the number of products selected for the lubrication of a vehicle must be kept far below the number usually employed by fleet operators. Lubrication will have to be accomplished under the most adverse conditions in and near the combat zone. Power-operated equipment will not always be available, and for this reason softer lubricants, which have less "staying ability," may have to be used because heavier products cannot always be applied by hand guns.

The need for a carefully planned program has been forcefully demonstrated by many considerations. The necessity for a substantial reduction in the number of different types of lubricants required for the proper lubrication of this equipment was made obvious when it was found that the instruction of the equipment manufacturers, if followed literally, require that each Army post and each field organization have available over twenty different grades of lubricating oil and thirty different grades of greases, in addition to many petroleum specialties and related products. The difficulties attendant to supplying such a wide variety of products are obvious; furthermore, the problem is aggravated by the fact that the more numerous the grades and types of lubricants are permitted to be, the more numerous are the chances of either the

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wrong lubricants being applied, or of no lubricants being available for application.

The supply position of the petroleum industry in various areas, the difference in the products offered for the same type of service by different companies, and the actual question of which product is best for military use must be taken into consideration in the planning of a truly comprehensive lubrication program.

The lubrication program developed by the Ordnance Department has been divided into four important phases: (1) the phase dealing with the products; (2) the phase dealing with lubrication instructions essential to insure proper use of these products; (3) that of providing the proper equipment for the application of these products and the interrelationship of design and lubrication; (4) a follow-up plan consisting of the selection and training of personnel for supervisory field work, together with the inauguration of a system of follow-up by the use of records covering the "case history" of each unit. In the event of failure, this information will be used to determine the possible cause of the difficulty. Finally, films and other instructional material are prepared for use by arm and service schools and training centers.

To understand the many and varied problems affecting the selection, simplification, designation, and standardization of products, it will be necessary first to review briefly the policies and practices in effect prior to the present emergency with respect to product recommendations and the interrelationship of the Ordnance Department, the Quartermaster Corps, and the various arms operating equipment issued by these services. In the past, the Ordnance Department, as a matter of policy, has attempted to adhere strictly to the recommendations of the manufacturers of equipment whether they be commercial concerns or Ordnance arsenals. In the case of commercial manufacturers, this was done in order not to invalidate warranties and, in both cases, because it was believed that the manufacturers "knew best" what their equipment required. Factual information has proved the latter not always to be the case. The variety of special and proprietary brands prescribed by the many manufacturers obviated the possibility of adhering to this policy from a supply standpoint.

It is the responsibility of the Ordnance Department to prescribe lubricants and lubrication practices for all ordnance materiel. However, only a very small per cent of the total volume of lubricants used for ordnance materiel is procured and issued by the Ordnance Department. All engine and chassis lubricants, whether for ultimate use in Ordnance or Quartermaster equipment, is issued by the latter. The need for the closest cooperation and coordination between these two services is very apparent. The appointment of a War Department Committee on Liquid Fuels and Lubricants, at the instigation of the Ordnance Department, has provided a means for the simplification and standardization of lubricants as well as fuels. Already a standard diesel fuel and a standard gasoline have been adopted and U. S. Army specifications written in order to permit the Army to retain the quality control of these products. One of the first actions of the War Department Committee on Liquid Fuels and Lubricants was to create a common language by standardizing an Army nomenclature for lubricants and related products which is likely to be adopted and designated by specifications. This is shown in Table 1.

LUBRICANT	SEASON
Engine Oil S.A.E. 10	Winter (Automotive)
Engine Oil S.A.E. 30	Summer (Automotive)
Engine Oil S.A.E. 50	Summer and Winter (Radial, Tank)
Diesel Engine Oil S.A.E. 10	Winter
Diesel Engine Oil S.A.E. 30	Summer
Gear Oil S.A.E. 80	Winter
Gear Oil S.A.E. 90	Summer
Gear Oil S.A.E. 140	Summer
E.P. Gear Oil S.A.E. 80 EP	Winter
E.P. Gear Oil S.A.E. 90 EP	Summer
Chassis Grease No. 0	Winter
Chassis Grease No. 1	Summer
Wheel Bearing Grease No. 2	Summer and Winter
Waterproof Grease, No. 4	Summer and Winter
Hydraulic Brake Fluid	Summer and Winter
Shock Absorber Fluid, Light	
Shock Absorber Fluid, Heavy	
Vacuum Cylinder Oil	

TABLE 1. U. S. ARMY STANDARD NOMENCLATURE FOR AUTOMOTIVE LUBRICANTS AND SPECIALTIES

It should be understood that the adoption of this nomenclature in no way precludes a further reduction in the number of products which will be made standard items of issue. It also should be understood that this list does not include items of Ordnance issue which are required solely for ordnance materiel. Instrument lubricants, recoil oils and similar products, which fall within the latter classification, are not considered within the scope of the War Department Committee on Liquid Fuels and Lubricants. They are discussed in subsequent paragraphs.

Those services designing equipment have been instructed by the Under Secretary of War to take cognizance of the standardization of fuels for Army vehicles. It is expected that those vehicles now requiring special fuels will soon be modified to permit the satisfactory operation of all vehicles in the armed forces on a single diesel fuel and a single gasoline. All lubricants generally required for the equipment issued by two or more services are rapidly being simplified, designated by U. S. Army specifications, and made "standard" by War Department regulations. Thus, a complete change in policy is being effected. In the future, all Army equipment, made to military characteristics and specifications, must perform satisfactorily on fuels and lubricants standardized by the War Department Committee on Liquid Fuels and Lubricants.

Quality has been given first consideration in the selection of all products, but availability necessarily has been given careful consideration also. In selecting products for particular items of equipment, the manufacturers' recommendations are studied carefully. When available, known performances in service — Army service — are weighed. After the type and consistency of the required products have been decided, all U. S. Government contracts are searched to determine if such products can be obtained under already existing contracts. A large percentage of all required oils can be obtained on the Navy Department's Annual Lubricating Oil Contract, and most of the required greases are listed in the General Schedule of Supplies, Class 14, issued by the Procurement Division of the Treasury Department.

When a required product is not provided by any existing Government contract, a search is made to determine if a satisfactory specification exists. The preparation of specifications is a lengthy and difficult procedure and is resorted to only after every effort has been made on the part of the various

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Correction

The following revision has been made in the article "Grease Consistency Investigations" which appeared in the April issue of the *Institute Spokesman*. Beginning with the fourth from the last line in column three on page 2 the ensuing paragraph should read:

Even though the three greases (Figure 7) are all NLGI No. 3 grade consistency, it will be noted, that pressure viscosities at the same 100 PSI have a range from 1,040″ to 30,000″ Saybolt. Although No. 3 Cup Grease and No. 3 Fibre Grease are both made with the same oil (100 Saybolt at 100°F), yet the pressure viscosities are 1040″ and 11,400″, respectively, (a ratio of 11 to 1) at correct pressures 100 and 210 PSI. The wheel-bearing grease (soda-soap-cylinder-stock) has a P.V. of 22,800″ Saybolt, or 22 times the viscosity of the Cup Grease, yet their consistencies are nearly identical.

Lubrication

(Continued from Page 2)

agencies concerned to utilize one already in existence.

When it has been definitely established that one or more commercial brands are vastly superior to the average products sold for certain purposes, "acceptable" brand lists are established, pending the preparation of satisfactory specifications. It has been found expedient to require prior product approval for many items before permitting concerns to bid, a practice long utilized by the Navy Department with excellent results.

The progress made in simplification and standardization can best be illustrated by the status of recoil oils today as contrasted with their status at the outset of the emergency. One year ago, the Ordnance Department was procuring, storing, and issuing eight different grades of recoil oil, covered by six separate specifications. Although it was originally intended that several of these specifications would be superseded or replaced, their use was still required in technical manuals and other regulations which had not kept pace with the change in products. An analysis of the various specifications revealed that two products, a light and a heavy recoil oil, would prove sufficient and that, by making improvements in the specifications, satisfactory operation over a wider temperature range would be provided. The approach and solution to this problem are illustrated by Table 2.

Those who have had experience in dealing with the standardization of lubricants and related products for the maintenance of a large variety of types and makes of mechanical equipment will appreciate the difficulties which are being surmounted. The number of different groups involved and their varied experience and training retards the speed of this work but assures a high degree of accuracy. All these endeavors have been closely coordinated with the petroleum industry and the related equipment manufacturers. The degree of cooperation between both groups has contributed much to the progress made.

The preparation and distribution of detailed lubrication instructions and guides for every unit of equipment requiring lubrication is second in importance only to providing proper lubricants. To prevent permanent damage due to improper lubrication and to reduce maintenance requirements, such instructions should be distributed prior to, or at the time of issuance of, the equipment for which they are intended. It will suffice to state that in the past not only have lubrication instructions failed to measure up to desired standards, but in many cases they were issued only after the equipment they covered had been in service many months. To remedy this, a carefully planned program has been placed in operation.

It became apparent early in the planning of this program that the most expeditious

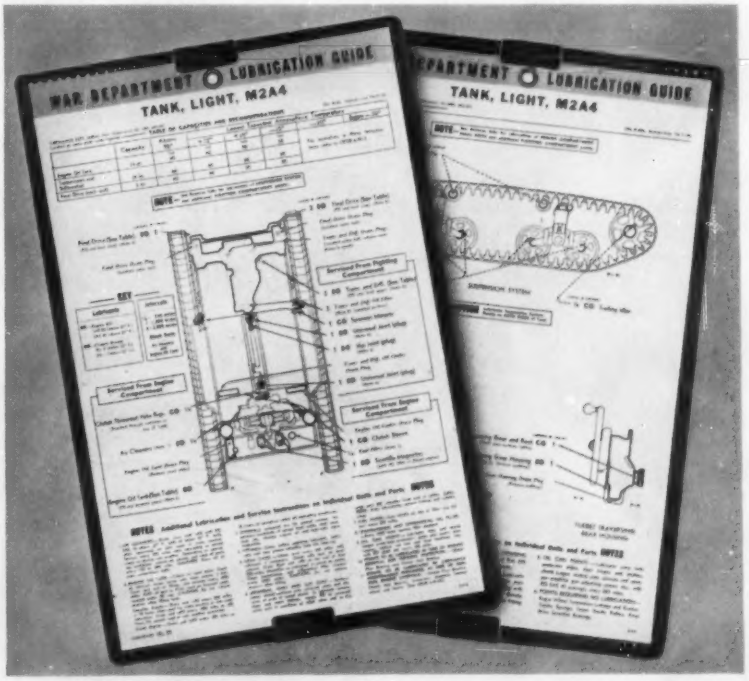

FIG. 1. LUBRICATION GUIDE (FRONT AND REVERSE SIDE) FOR THE LIGHT TANK

method of obtaining results would be to contract for as much of the work as possible with organizations experienced in lubrication engineering which were already equipped with the man power and facilities to go into immediate production. With this in mind, a contract was negotiated with the Chek-Chart Corporation of Chicago, Ill., which has been engaged in this type of work for the past eleven years. This company prepares the lubrication information used by most of the major oil companies in their service stations today. In its civilian pursuits, the Chek-Chart Corporation has developed lubrication diagrams and procedures covering all types of passenger cars, trucks, tractors, and other types of mechanical equipment. It was believed that these would be readily adaptable to ordnance materiel. Although most of the men into whose hands Army maintenance will of necessity be placed have had no previous experience with such equipment, the Chek-Chart Corporation has prepared most of the training programs and material used by the petroleum industry for training similarly inexperienced personnel, so it is well qualified to handle this situation. The contract negotiated with the Chek-Chart Corporation covers three basic items:

1. This item will be a bound manual containing general lubrication instructions for all types of ordnance materiel and is designed to give the reader a broad fundamental lubrication knowledge. It measures 6 by 9 inches and will contain approximately 304 pages, together with about 400 illustrations. It is being written in a manner which should provide interesting reading and will be issued to all supervisory personnel as well as to all service schools and instructing personnel. This manual is divided into three important sections. The first treats the fundamentals of lubrication, covering a brief history of petroleum, the high lights of refining and blending, and the specifications and testing of oils. The second part will be devoted to a clarification and explanation of proper lubrication procedure for all ordnance automotive and artillery materiel. The third and final part will discuss lubrication from the standpoint of variable operating conditions and the lubrication problems that may be encountered under actual field conditions. This manual will provide a complete general lubrication reference for the use of maintenance personnel and will be of great assistance to the various arm and service schools and instructors. The use of this manual by new military personnel during the course of their instruction will equip them with the fundamentals of lubrication which will insure a better knowledge of the lubrication maintenance of any ordnance materiel which they may have to use or service.

2. This item will be issued as a loose-leaf binder designed to contain detailed lubrication instructions (Ordnance Field Service bulletins, six series) for all major items of ordnance equipment. These bulletins will be reproduced as a part of the technical manual of the equipment concerned, and the loose-leaf feature of the binder will permit deletions and additions to be made from time to time. In addition to the bulletins, it will contain general lubrication instructions pertaining to ordnance artillery and automotive materiel. A section likewise will be devoted to a "product guide" which will list all lubricants to be used in ordnance automotive and artillery materiel, whether they are purchased by the Ordnance Department or the Quartermaster Corps. This binder is designed to make concise lubrication instructions for each piece of materiel, together with a complete list of the products to be used, readily accessible to personnel in the field.

3. This item consists of individualized War Department lubrication guides for ordnance automotive and artillery materiel. The guides embody suitable lubrication diagrams, completely identifying all points of lubrication, specifying lubricants to be used, and indicating lubrication intervals for each point. The guides measure approximately ten by fifteen inches and are mounted on heavy bristol board. The surfaces are coated with cellophane for protection against water, grease, and dirt, and each guide is edged with metal for further protection. Figure 1 indicates the style of the guides. Each guide contains footnotes used to clarify information that space prohibits being given in the body of the guide. A table of capacities and recommendations lists the types of lubricants to be used in the engines and gear housings under various atmospheric temperatures. Lubrication guides for the scout car and the half-track mortar carrier will be reproduced in the next issue of *Institute Spokesman*.

(To Be Continued)

	Viscosity, Saybolt Universal Seconds								Viscosity Index	Viscosity, Keniematic				Pour Point	Gravity @ 60° F.		
										Centistokes			Centipoises, High Pressure	Degrees F.	Degrees A.P.I.	Specific Gravity	
	100° F.		70° F.		30° F.		—40° F.			100° F.	30° F.	—40° F.	100° F.				
Light Grades *New*	*min.*	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*min.*	*max.*	*max.*	*min.*	*max.*	*min.*	*min.*	*max.*
Oil, recoil, U.S.A. 2-36D										4.0		110		—50			
Replace U. S. A. 2-77	45	50	55	65										—45			
U.S.A. 2-36C (light)	45	75												— 5			
RIXS 42	43		55	75		145								0		0.835	0.870
RIXS 42 (Rev. 1)	43		55	70		170		500						—25			
RIXS 189	38	40												—45	39		
Heavy Grades *New*																	
Oil, recoil, U.S.A. 2-96A										82.0	1120		60	—20		0.860	0.885
Replaced U.S.A. 2-96	385	430				5000								—30			
RIXS 121B	380	400							115				35	—20			
RIXS 121 (Rev. 3)	380	400							115				60	—20			
U.S.A. 2-36 (heavy	385	400												— 5			

TABLE 2. RECOIL OIL SPECIFICATIONS

WANTED—To buy several portable film strength demonstrating machines, either Timken bearing as standard wear parts, or block and pin type of machines with or without torque indicator—60 cycle 210 AC motors. Give price, condition, age and description. Will arrange for examination.

BORDEN OIL COMPANY
Lubrication Specialists
Sheboygan, Wisconsin

SWAN-FINCH OIL CORP.

RCA Building 201 N Wells St.
New York, N. Y. Chicago, Ill.

Manufacturers

Lubricating Oils — Greases
Foundry Core Oils

FISKE BROTHERS REFINING CO.

Established 1870

★

NEWARK, N. J.

TOLEDO, OHIO

★

Manufacturers of

LUBRICATING GREASES

method of obtaining results would be to contract for as much of the work as possible with organizations experienced in lubrication engineering which were already equipped with the man power and facilities to go into immediate production. With this in mind, a contract was negotiated with the Chek-Chart Corporation of Chicago, Ill., which has been engaged in this type of work for the past eleven years. This company prepares the lubrication information used by most of the major oil companies in their service stations today. In its civilian pursuits, the Chek-Chart Corporation has developed lubrication diagrams and procedures covering all types of passenger cars, trucks, tractors, and other types of mechanical equipment. It was believed that these would be readily adaptable to ordnance materiel. Although most of the men into whose hands Army maintenance will of necessity be placed have had no previous experience with such equipment, the Chek-Chart Corporation has prepared most of the training programs and material used by the petroleum industry for training similarly inexperienced personnel, so it is well qualified to handle this situation. The contract negotiated with the Chek-Chart Corporation covers three basic items:

1. This item will be a bound manual containing general lubrication instructions for all types of ordnance materiel and is designed to give the reader a broad fundamental lubrication knowledge. It measures 6 by 9 inches and will contain approximately 304 pages, together with about 400 illustrations. It is being written in a manner which should provide interesting reading and will be issued to all supervisory personnel as well as to all service schools and instructing personnel. This manual is divided into three important sections. The first treats the fundamentals of lubrication, covering a brief history of petroleum, the high lights of refining and blending, and the specifications and testing of oils. The second part will be devoted to a clarification and explanation of proper lubrication procedure for all ordnance automotive and artillery materiel. The third and final part will discuss lubrication from the standpoint of variable operating conditions and the lubrication problems that may be encountered under actual field conditions. This manual will provide a complete general lubrication reference for the use of maintenance personnel and will be of great assistance to the various arm and service schools and instructors. The use of this manual by new military personnel during the course of their instruction will equip them with the fundamentals of lubrication which will insure a better knowledge of the lubrication maintenance of any ordnance materiel which they may have to use or service.

2. This item will be issued as a loose-leaf binder designed to contain detailed lubrication instructions (Ordnance Field Service bulletins, six series) for all major items of ordnance equipment. These bulletins will be reproduced as a part of the technical manual of the equipment concerned, and the loose-leaf feature of the binder will permit deletions and additions to be made from time to time. In addition to the bulletins, it will contain general lubri-

	Viscosity, Saybolt Universal Seconds								Viscosity Index	Viscosity,	
										Centistokes	
Light Grades *New*	100° F.		70° F.		30° F.		—40° F.			100° F.	30° F.
	min.	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*max.*	*min.*	*min.*	*max.*
Oil, recoil, U.S.A. 2-36D										4.0	
Replace U. S. A. 2-77	45	50	55	65							
U.S.A. 2-36C (light)	45	75									
RIXS 42	43		55	75		145					
RIXS 42 (Rev. 1)	43		55	70		170		500			
RIXS 189	38	40									
Heavy Grades *New*											
Oil, recoil, U.S.A. 2-96A										82.0	1120
Replaced U.S.A. 2-96	385	430				5000					
RIXS 121B	380	400							115		
RIXS 121 (Rev. 3)	380	400							115		
U.S.A. 2-36 (heavy	385	400									

Table 2. Recoil Oil Specifications

Title 32—National Defense

CHAPTER XIII—OFFICE OF PETROLEUM COORDINATOR FOR NATIONAL DEFENSE

[Recommendation No. 40, Amendment]

PART 1504—PROCESSING AND REFINING

Refining and Distribution of Automotive Lubricants Containing Additives.

To all manufacturers and compounders of petroleum lubricating oils and greases, and all marketers of automotive lubricating oils and greases:

Pursuant to the President's letter of May 28, 1941, establishing the Office of Petroleum Coordinator for National Defense, §§ 1504.40 to 1504.49 of this chapter (Recommendation No. 40, dated March 16, 1942) are hereby amended to read as follows:

§ 1504.40 *Definitions.* For the purposes of §§ 1504.40 to 1504.49, inclusive, of this chapter, the following terms shall have the following meanings:

(a) "Passenger Car" means any motor vehicle designed and used for the carrying of passengers, including but not limited to station wagons, delivery trucks under ¾ ton rated capacity, taxicabs, limousines and business cars, but not to include police or fire department cars or motorcycles, ambulances, busses, or motor vehicles in the official use of the armed forces of the United States.

(b) "Additive" means any material which is added to and made a part of a finished petroleum product for the purpose of altering any characteristic of that product.

(c) "Cresol" means the phenol derivative known as Cresol, including all types of Cresol from whatever source derived.

(d) "Chlorine" means the chemical element chlorine, having atomic number 17.

(e) "Manufacturer" means any person who processes, reprocesses, or in any manner alters (including compounding and blending) petroleum or petroleum products into finished petroleum lubricating oils and greases.

(f) "Distributor" means any person who receives petroleum products from a Manufacturer or another Distributor for delivery to another Distributor, to a Retailer or to a consumer.

(g) "Retailer" means any person who delivers petroleum products to a consumer or into a consuming facility.*

§§ 1504.40 to 1504.49, inclusive, issued under the authority contained in the President's letter of May 23, 1941 to the Secretary of the Interior (6 F.R. 2760).

§ 1504.41 *Limitation on Use of Cresol.* All automotive lubricating oils or greases manufactured subsequent to April 6, 1942, and containing any Additive requiring Cresol in its manufacture shall be designated as "Not for use in passenger cars," and the words quoted shall appear plainly and prominently on all containers containing such products. All Manufacturers using Cresol in any additive shall immediately seek a substitute for Cresol in such use.*

§ 1504.42 *Limitation on Use of Detergent or Detergent-Disperser Type Additives:* All automotive lubricating oils manufactured subsequent to April 6, 1942, and containing any Additive of the metallic detergent, or detergent-disperser, type shall be designated as "Not for use in passenger cars," and the words quoted shall appear plainly and prominently on all containers containing such products. Manufacturers shall immediately reduce the amount or use of the above type additive for all other purposes wherever and to whatever percentage possible and practicable.*

§ 1504.43 *Limitation on Use of Oxidation Inhibitor Type Additive.* Manufacturers shall immediately reduce the use or amount of oxidation inhibitor type additives wherever and to whatever percentage possible and practicable.*

§ 1504.44 *Pour Point Depressants.* Manufacturers shall immediately reduce the use of pour point depressants to whatever extent possible and practicable by the following means:

(a) Lubricating oils shall be dewaxed to lower pour point specifications by utilizing dewaxing facilities to maximum capacity.

(b) Pour point specifications shall be revised to the highest allowable specifications to meet safely the temperature requirements of each locality.*

§ 1504.45 *Extreme Pressure Lubricants.* With respect to lubricating oils and greases manufactured subsequent to April 6, 1942 for civilian use, Manufacturers and Distributors thereof shall reduce the use of critical additive materials required for extreme pressure lubricants to whatever extent possible and practicable but by not less than 25% of the amount of each such materials used by each such Manufacturer and Distributor during the calendar year 1941, adjusted upward or downward as the case may be in the direct proportion that current civilian sales volume bears to civilian sales volume in the calendar year 1941, in any one or more of the following ways:

(a) Substitution of a straight mineral oil type lubricant for use in Passenger Car transmissions.

(b) A change in formula for such extreme pressure lubricants.

(c) Elimination of the manufacture of any chassis lubricant requiring chlorine or other critical additive material in its manufacture.

(d) Elimination where possible, and where permissible by automotive manufacturer's specifications, the use of universal (all-purpose) type or any other type of extreme pressure lubricants in the transmissions of equipment other than Passenger Cars. Where such products are required to be used, specifications for use shall be given on lubricating oil charts and on the containers containing such products.

(e) Elimination to whatever extent possible and practicable of the use of chlorine or other critical additive material in the manufacture of extreme pressure lubricants, and replacement wherever possible and practicable of extreme pressure lubricants containing chlorine or other critical additive materials with other types of mild extreme pressure or hypoid gear lubricants.*

§ 1504.46 *Distribution or Dispensing of Petroleum Lubricating Oils and Greases.* No Distributor or Retailer shall receive any products designated and marked pursuant to §§ 1504.41 or 1504.42 of this chapter for uses restricted by such designation and marking, and no Distributor or Retailer shall place any such product in any Passenger Car or part thereof coming within such restrictions.*

§ 1504.47 *Protective Measures.* Manufacturers and Distributors of lubricating oils and greases shall make all necessary provisions for the proper designation and marking of products and containers to assure the distribution of all products affected by §§ 1504.40 to 1504.46, inclusive, of this chapter to their proper uses, and shall caution all employees and Retailers against the improper uses of such products. The manufacturers of automotive vehicles shall cooperate with the Manufacturers of lubricating oils and greases by specifying for use in Passenger Cars those products which conform to the restrictions effected by §§ 1504.40 to 1504.46, inclusive, of this chapter and shall caution the public in the more careful use of Passenger Cars where such care becomes necessary because of the altered characteristics of such products.*

§ 1504.48 *Reports.* On May 15, 1942, and again on July 1, 1942, each Manufacturer of lubricating oils and greases shall forward to the Office of Petroleum Coordinator for National Defense, Washington, D. C., a report showing the results which each has obtained through the application

(Continued on page 7)

A. B. E. Bulletin

INTERPRETATION OF RECOMMENDATION No. 40 AMENDMENT

By J. HOWARD PILE
CHEK-CHART, WASHINGTON OFFICE

The Petroleum Coordinator issued "Recommendation No. 40" on March 19, 1942. This Recommendation restricted the use of critical materials in the manufacturing of certain motor oils and gear lubricants.

Considerable misunderstandings, misinterpretations and incorrect impressions have been circulated through the petroleum industry as to the exact meaning of the ruling and what O.P.C. is striving to accomplish.

A new ruling, dated April 20, 1942, known as "Recommendation No. 40 (amendment)" has now been issued. Complete copy appears in this issue on Page 5. This supersedes previous "Recommendation No. 40."

Our Washington office has been in constant contact with the O.P.C. for the past two weeks and as a result is able to provide following interpretation of the new ruling:

1. Motor Oils for passenger cars (See paragraph 1504.42). Lubricating oils manufactured subsequent to April 6, 1942 that contain cresol, detergent or detergent disperser additives shall be labeled: "*Not for use in passenger cars.*"

2. *The above (Item 1) does not apply to trucks or tractors.* However, it is desired that oils *not* containing the above critical materials be used wherever they can be used without harm to the engines. Manufacturers of truck and tractor engines and supplying oil companies are expected to issue recommendations on this point.

3. Greases for passenger cars (See paragraph 1504.41). Greases manufactured subsequent to April 6, 1942 containing additives requiring cresol in their manufacture, shall be labeled: "*Not for use in passenger cars.*"

4. The foregoing (Item 3) does not apply to trucks and tractors. However, here again, if any grease manufacturers are using an additive that requires cresol, they are requested to seek a substitute for cresol if the parts to be lubricated will not suffer in any respect from the use of grease containing a substitute.

5. Extreme Pressure Lubricants, Universal Lubricants or All-Purpose type lubricants for passenger car transmissions (See paragraph 1504.45). The above types of lubricants *are to be eliminated from use in passenger car transmissions* where possible and where permissible by automotive manufacturers' specifications and recommendations. While the foregoing does not apply to trucks and tractors, naturally it will be the desire of the oil and automotive industries to cooperate with this request and wherever possible and permissible supply recommendations to service all transmissions and other units with lubricants that *do not* contain any critical materials.

The CHEK-CHART Detroit Editorial-Engineering office is now checking each manufacturer for definite recommendations under these new conditions in order that everyone in the industry may fully comply with the O.P.C. rulings and desires. This information will be sent all CHEK-CHART clients as soon as the survey and check is completed. Unofficially all passenger car manufacturers have agreed to the use of straight mineral gear lubricant in transmissions where E.P. lubricants were previously recommended.

6. Differentials. *The above does not apply to differentials* (rear axles) for passenger cars, trucks or tractors. Where a Hypoid, Extreme Pressure, Universal or All-Purpose type of gear lubricant is recommended and needed, the unit is to be so serviced. In other words, there is no desire on the part of the Government to take away a necessary lubricant where it might mean the destruction of gears or other units.

Conservation Maintenance is today's watchword. Protect vital parts of cars, trucks and tractors by using those lubricants that best answer the purpose but—keep in mind at all times the desire to eliminate, *wherever possible,* the use of any lubricant that contains any critical materials.

7. Passenger cars are defined in the recommendation to include all vehicles designed and intended for carrying passengers and also including but not limited to station wagons, delivery trucks under ¾ ton rated capacity, taxicabs, limousines and business cars. Certain public service vehicles such as police vehicles, fire vehicles, ambulances, buses and motor vehicles in official use by armed forces of the U. S. are not considered as passenger cars.

A few of the most critical materials are:

Chlorine	Toluene	Aniline
Phenol		Cresol

These are the critical materials as of today and as the war progresses and other items are urgently needed to carry on the war, the list may be greatly enlarged. Our Army and Navy need these critical materials.

The future availability or scarcity of critical materials for lubricant additives will depend entirely on the degree of cooperation of the automotive industry, the petroleum industry and of vehicle operators.

If every possible effort is made Now to use these critical materials ONLY where they are necessary, it is likely there will be enough critical materials available to last for some time. If we keep on using NECESSARY materials for UNNECESSARY purposes, *then there will not be enough even for necessary uses.*

Three methods suggested by O.P.C. for reducing the usage of critical materials are:

(a) Substitution of a straight mineral oil type lubricant for use in Passenger Car transmissions.

(b) A change in formula for such extreme pressure lubricants.

(c) Elimination of the manufacture of any chassis lubricant requiring chlorine or other critical additive material in its manufacture.

(d) Elimination where possible, and where permissible by automotive manufacturer's specifications, the use of universal (all-purpose) type or any other type of extreme pressure lubricants in the transmissions of equipment other than Passenger Cars. Where such products are required to be used, specifications for use shall be given on lubricating oil charts and on the containers containing such products.

(e) Elimination to whatever extent possible and practicable of the use of chlorine or other critical additive material in the manufacture of extreme pressure lubricants, and replacement wherever possible and practicable of extreme pressure lubricants containing chlorine or other critical additive materials with other types of mild extreme pressure or hypoid gear lubricants.*

The Recommendation No. 40 (amended), is fair and reasonable in its request to reduce the critical additive materials to the greatest extent possible and practical, *but by not less than 25%* as used by the same manufacturer during the calendar year of 1941.

We feel that the request merits the close cooperation of everyone in the industry from the president and top ranking officers right on down the line to the service station operator. The service station operator, if provided with definite instructions, can do a great deal in passing on to the motoring public, owners of trucks and tractors the real purpose and desires of the O.P.C. and we think you will find the public perfectly willing to cooperate.

The O.P.C. requests immediate and widespread publication of these regulations. CHEK-CHART is glad to release this information with or without credit for your use.

National Lubricating Grease Institute Lubrication Bulletin

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Spring Isn't Just Around the Corner — It's Here!

Right now is the time for action if we are to conserve American automobiles and make them last for the duration of the war.

Spring change-over this year means more than just changing to summer lubricants—it means complete inspection and servicing—complete Conservation Maintenance!

Under ordinary conditions, certain services should be performed to provide safe, economical and comfortable transportation. But today these and many other services are "musts" in America's efforts to chase the Nazis and Japs back into their holes.

Spring—1942—offers service station operators two great opportunities:

1. To perform Conservation Maintenance services from which can be obtained sufficient income to stay in business.

2. To show car owners the *necessity today* of regular and proper maintenance, and to prove the *advantages* to be obtained from these services in normal times.

To cash in on these two opportunities requires aggressive selling and thorough and careful execution of a Conservation Maintenance program. First of all, the two most important spring services should be performed on every car — lubrication and cooling system conditioning. These are absolute essentials to best car performance throughout the summer months and of greatest immediate consequence.

From the minimum necessary requirements involved in these two services, the dealer can obtain $7.05.

Lubrication	
Crankcase drain, flush and refill	$1.50
Chassis Lubrication	1.00
Drain, flush and refill transmission and differential	1.80
Total	$4.30
Cooling System Service	
Complete inspection, flushing and adjustments	2.75
Total	$7.05

These are the necessities of normal times. Add to these the Conservation Maintenance requirements of today—tire and tube service, starting, lighting and ignition service, appearance items, additional lubrication operations and miscellaneous services—and you will find a potential of approximately $24.50 for each car this is expected to serve under today's operating conditions.

It may be difficult to sell every car owner all of these services immediately, and it is doubtful that every car actually requires all of these services today. However, these are Conservation Maintenance services which should be performed on every vehicle during the next few months—this spring—and at regular intervals thereafter—if cars are to last throughout the war.

Plan now to solicit aggressively every car owner within range of your service. Ask every person who comes into your station or garage; advertise your services; make telephone calls, and personally solicit car owners in your neighborhood.

Line up every possible car you can for spring servicing. Sell lubrication and cooling system service first—they're important! Then sell the other services that will put every car in tip-top shape and keep it there.

Make your station or garage a Conservation Maintenance center and you'll be doing your bit toward winning the war.

Title 32—National Defense

(Continued from page 5)

of §§ 1504.40 to 1504.49, inclusive, of this chapter. Such reports shall show the former use of additives (total volume used and percentage of mix), and the change in quality or specifications of products brought about by substitution or reduction in the use of additives. Such reports shall classify such information as to all types of uses, classes of deliveries, and localities (where specifications vary as between localities).*

§ 1504.49 *Exception.* Any Manufacturer who has reason to believe that the use of materials restricted by §§ 1504.40 to 1504.48, inclusive, of this chapter, in any additive which he manufacturers or employs for use in any lubricating oils or greases will not interfere with the war effort or seriously affect essential civilian needs, or any Manufacturer who believes that compliance with said sections will work an unnecessary and unreasonable hardship upon him, may apply to the Petroleum Coordinator for National Defense for an exception to any such section or provision thereof.*

(Sgd.) R. K. Davies,
Deputy Petroleum Coordinator
for National Defense.

April 20, 1942.

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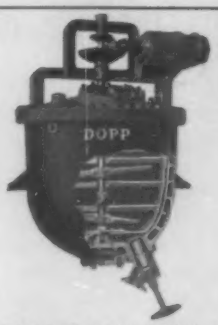

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